BY ORDER OF THE COMMANDER
AIR FORCE MATERIEL COMMAND

AIR FORCE MATERIEL COMMAND
INSTRUCTION 15-102

2 JULY 2024

Weather

TERRESTRIAL AND SPACE WEATHER SUPPORT ACROSS THE INTEGRATED LIFE CYCLE MANAGEMENT FRAMEWORK

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(Donald R. Ball, NH-04)

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This instruction implements the objectives of Air Force Policy Directive (AFPD) 15-1, *Weather Operations*, and DAFMAN 15-129, *Air and Space Weather Operations*, by providing guidance and identifying, establishing, and sustaining terrestrial and space weather support to Air Force (AF) Research, Development, Test, and Evaluation (RDT&E) and Army Research, Development, and Acquisition (RDA). This instruction applies to all AF personnel, including Air Force Reserve and Air National Guard, supporting AF RDT&E. It establishes policy and procedures for managing Air Force Materiel Command (AFMC) terrestrial and space weather support to Air Force acquisition programs and technology-based efforts. It identifies the responsibilities to determine, document, and coordinate terrestrial and space weather support requirements of Air Force acquisition programs from concept through system retirement, including deployment and some aspects of employment in accordance with AFPD 63-1/20-1, *Integrated Life Cycle Management*. This instruction specifies the development of documents detailing terrestrial and space weather support concepts and methodology. This publication may not be supplemented by lower organizational elements. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the DAF 847, *Recommendation for Change of Publication*; route DAF 847 from the field through the appropriate functional chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) AFI 33-322, *Records Management and Information Governance Program*, and disposed of IAW the Air Force Records Information Management

System (AFRIMS) Records Disposition Schedule (RDS). Submit requests for waivers through the chain of command to the appropriate waiver approval authority, through the publication OPR.

SUMMARY OF CHANGES

Changes references of "staffmets" to "Research, Development, Test, and Evaluation" (RDT&E) Meteorologists, updated references, and the removal of continuation training requirements.

1. Acquisition Weather Support.

1.1. **Purpose.** To ensure the success of RDT&E and RDA efforts across AFMC with integrated weather support. This instruction outlines processes and provides guidance to ensure meteorological expertise, knowledge, and related infrastructures are aligned and integrated appropriately within AF acquisition related activities.

1.2. **Objective.** To support operationally relevant and cost-effective research, development, deployment, sustainment, and improvement of AF weapon systems. Meteorological subject matter experts throughout AFMC and lead commands identify support requirements, resolve/mitigate deficiencies and/or gaps, and integrate meteorological intelligence into the life cycle management of weapons systems. Meteorologists can be assigned and embedded within AFMC to support HQ AFMC organizations, to include the Air Force Research Laboratory (AFRL), Air Force Life Cycle Management Center (AFLCMC), Air Force Sustainment Center (AFSC), Air Force Test Center (AFTC), Air Force Nuclear Weapons Center (AFNWC), and Air Force Installation and Mission Support Center (AFIMSC). These meteorologists will be collectively referred to as "RDT&E Mets" through the entirety of this instruction. RDT&E Mets perform or support research, development, acquisition, and testing of AF weapon systems and capabilities by identifying, documenting, and providing assistance to resolve environmental sensitivity issues to support acquisition programs. RDT&E Mets also prepare the Air Force and Army operational terrestrial and space weather communities to support new weapon system development and implementation by assisting lead commands with defining tactics, training, and procedures for operational support.

2. Roles and Responsibilities.

2.1. **HQ AFMC/A3OW will:**

2.1.1. Provide organizational structure, training guidance/recommendations, and equipment/tool recommendations to manage all operational and acquisition weather support within the command. Maintain awareness and advise leadership both within the command and at Headquarters Air Force (HAF) and Headquarters Air Combat Command (ACC) on emerging technology areas requiring specialized terrestrial and space weather support. Work with AFRL Space Weather subject matter experts (advice, help and support) as needed to support leadership briefings on space weather effects. Manage RDT&E Mets to support materiel solution development.

2.1.2. Provide functional oversight, policy guidance and assistance to RDT&E Mets; assist with resolving manpower shortfalls; visit supported organizations to determine requirements for meteorological assistance; assist customers in analyzing environmental sensitivities of systems; assess the need for terrestrial and space weather support; evaluate

the need for other types of weather support; provide or arrange for support and request assistance from other agencies, as needed.

2.1.3. As needed, review requirements documents and appropriate information sources (e.g., databases, reports) for operational thresholds and potential impacts related to the supported program/project/work unit and provide affected organizations guidance.

2.1.4. Annually (November), review "Program/Project/Work Unit Briefs" (**Attachment 2**), "Emerging Technologies and Weapon Systems" reports (**Attachment 3**), and distribute to Air Force Weather functional staffs and other offices as needed for planning, programming, and budgeting activities.

2.1.5. Assist RDT&E Mets, as needed, with support required for the transition from Developmental Test and Evaluation (DT&E) to Operational Test and Evaluation (OT&E), or in providing/arranging for support if DT&E and OT&E are combined.

2.1.6. Facilitate, as needed, interactions on issues concerning terrestrial and space weather support requirements and acquisition processes.

2.1.7. Assist RDT&E Mets with professional development. This includes working with the supported unit and Major Command (MAJCOM) Functional Area Manager for coding of acquisition positions to ensure required level of certification is obtained. This includes assistance with continuation training to include recommended online, formal classes/courses, symposiums, conferences, etc. Manage a crossfeed program to exchange technical, acquisition, and other appropriate information within AFMC and among other interested offices. The intent is to help RDT&E Mets understand how and where terrestrial and space weather can influence a program/project/work unit or new initiative throughout its life cycle.

2.1.8. Validate program/project/work unit weather support requirements documented by RDT&E Mets and submit to HQ ACC/A5W, Weather Requirements Division.

2.2. **AFMC RDT&E Mets will:**

2.2.1. Provide or arrange for environmental support to respective program/project/work unit offices during RDT&E and RDA; coordinate test criteria and meteorological support for weather-sensitive systems under test and for programs as initiated and updated by the program/project/work unit office; consult with appropriate T&E support agencies on any DT/OT&E weather support requirements.

2.2.2. Identify and document, in direct coordination with program/project/work unit offices, environmental thresholds in Department of Defense (DoD) procurement and acquisition policies/documentation (e.g., Defense Federal Acquisition Regulation Supplement and DoD Directive (DoDD) 5000.01, *The Defense Acquisition System*) as required. Documentation will include systems' terrestrial and space weather sensitivity impacts and potential design criteria impacts for the supported effort. Identify potential weather support shortfalls to supported offices and HQ AFMC/A3OW, Weather and Environmental Science Branch.

2.2.3. Determine and communicate to HQ AFMC/A3OW organizational meteorological support requirements to include assisting program/project/work unit offices in analyzing environmental sensitivities of systems, assessing the need for weather support, evaluating

other types of weather support requirements, providing or arranging for support and requesting assistance from other agencies as needed.

2.2.4. Identify, in coordination with HQ AFMC/A3OW, tactics, techniques and procedures for new weapon systems supported throughout by Air Force weather operations as outlined by DoDD 5000.01. Identification practices should include research in AF, designated DoD agencies and DoD approved public and private institutions and conducting comprehensive gap analyses to reveal potential meteorological support and capability gaps or deficiencies.

2.2.5. Submit annual Program/Project/Work Unit briefs to HQ AFMC/A3OW on/about 15 October, on all programs requiring terrestrial and space weather support at their location, including estimated value-added, in accordance with **Attachment 2**. Regarding life cycle costs, if only a part of a program's life cycle is supported (e.g., T&E), report that value. If the entire life cycle costs are known, report that in parentheses (e.g., $5M ($65M)). Coordinate reported life cycle costs and draft briefs with the acquisition program manager prior to report submission. If no change has occurred since the last submission, report "no change." (HQ AFMC/A3OW will facilitate creation of this report by posting the previous year's report on SharePoint for editing.)

2.2.6. Prepare and submit "Emerging Technologies and Weapon Systems" report (**Attachment 3**) on/about 15 October. Reports will be an annual assessment to help terrestrial and space weather planners at all levels take into account emerging technologies and weapon systems being developed by and for the DoD that may or will have terrestrial and space weather sensitivities and may or will need weather support capabilities. Emphasis is on identifying new or enhanced weather support capabilities that are not yet available or planned and will be needed to support future developmental testing and operations but before the weapon system is to be operationally tested and fielded. (HQ AFMC/A3OW will facilitate creation of this report by posting the previous year's report on SharePoint for editing.)

2.2.7. Provide consultation services related to development of terrestrial and space weather support concept of operations (CONOPS) and on operating and environmental support and modeling and simulation requirements for new systems and inclusion in system requirements documents as needed/requested. This includes, but is not limited to, technical reviews of contract statements of work.

2.2.8. As applicable to assigned duties, complete initial training to include completing the requirements for Program Management, Test and Evaluation, and/or Science and Technology Manager Foundational certification through Defense Acquisition University (**https://www.dau.edu/**). **Note:** individuals must perform duties for respective certification more than fifty percent of the time and only one certification can be pursued at a time. Complete recommended meteorological and acquisition online courses, formal classes/courses, symposiums, conferences, etc. Review all publications cited in this instruction (**Attachment 1**) and the Acquisition Intelligence Guidebook to help understand how and where weather can influence a program/project/work unit/new initiative throughout its life cycle and how that process is managed. Maintaining and pursuing professional development is critical to providing the best possible support to customers.

2.3. **Acquisition and RDT&E leaders/directors (Program Managers, Single Managers, Product Directors, Technology Directors, Development Planning Team Leaders, or Initiative Leads) will:**

2.3.1. Consult with assigned and/or associated RDT&E Mets to ensure terrestrial and space weather effects are considered in program/project/work unit capability and requirements development, planning, and processes.

2.3.2. Provide RDT&E Mets access to program/project/work unit technical details, requirements, and capabilities so assessment of future weather sensitivities and weather support requirements can be determined and planned for by Commander, HQ ACC and acquisition/RDT&E program offices.

2.4. **Headquarters and Centers (HQ AFMC A2 & A5/8/9, AFRL, AFLCMC, AFSC, AFTC, AFNWC, AFIMSC) will:**

2.4.1. Consult with RDT&E Mets to ensure terrestrial and space weather effects and support requirements are assessed throughout the life cycle of portfolio/program/project/work unit technologies and weapon systems.

2.4.2. Provide RDT&E Mets access to program/project/work unit technologies and weapon systems' technical details, requirements, and capabilities so assessment of weather sensitivities and weather support requirements can be planned. RDT&E Mets need access from the beginning of concept definition and throughout the program's life cycle to provide technical assistance in mitigating the effects of adverse impacts from terrestrial and space weather phenomena; reduce research, development and acquisition costs; and ensure Air Force Weather resources are prepared to support development, testing and fielding/operational employment of emerging technologies and weapon systems.

2.4.3. Support professional development of assigned and/or attached RDT&E Mets to include acquisition professional development program certifications and continuation training. Provide recommendations for specialized classes/courses, symposiums, conferences, etc., that would provide further understanding to supported technologies/efforts.

3. Acquisition.

3.1. **Defense acquisition.** The Defense Acquisition System is the management process by which, the DoD provides effective, affordable, and timely systems to the users as stated in DoDD 5000.01. An Acquisition Program is a directed; funded effort that provides a new, improved, or continuing materiel; weapon or information system or service capability in response to an approved need. A simplified and flexible management framework for translating capability needs and technology opportunities, based on approved capability needs, into stable, affordable, and well-managed acquisition programs that include weapon systems, services, and automated information systems is outlined in DoD Instruction (DoDI) 5000.02, *Operation of the Adaptive Acquisition Framework*.

3.1.1. Terrestrial and space weather personnel are key players within the AF acquisition process. RDT&E Mets provide all necessary technical advice, information and aid, from terrestrial and space weather perspectives, to AFMC acquisition programs/projects/work

units through all phases of the acquisition life cycle. RDT&E Mets work with the respective program/project/work unit offices to identify and quantify weather sensitivities.

3.1.2. RDT&E Mets identify weather support requirements for AF acquisition and technology-based programs. RDT&E Mets ensure weather support requirements and resources are identified in technology and acquisition documents and coordinated through the supported program/project/work unit offices. Inclusion of weather requirements in such documentation assists the Lead Command for the AF Weather Weapon Systems in giving comprehensive, equitable consideration and program-associated funding through Future Years Defense Program as necessary.

3.2. **Development planning.** Development planning encompasses the engineering analysis and technical planning activities that provide the foundation for informed investment decisions on the fundamental path a materiel development will follow to effectively and affordably meet operational needs. Some development planning is performed proactively, in anticipation of future needs per AFPD 63-1/20-1, *Integrated Life Cycle Management*.

3.2.1. RDT&E Mets support the development planning process by assisting with the translation of operational deficiencies into technological needs in the earliest stages of the acquisition process. Successful translation requires an intimate understanding of warfighter needs and a close interaction with industry, the Science and Technology (S&T) community, academia, AFRL's Battlespace Environment Lab and AFMC Program Offices to develop materiel and non-materiel solutions for identified shortfalls. RDT&E Mets must work within these established acquisition processes to ensure systems are developed that work effectively in their intended terrestrial and space environments. AFRL uses its significant investment, expertise and knowledge to interface with the S&T community for space and terrestrial weather needs as an explicit part of this process, particularly as weather has cross-cutting impacts throughout the space and terrestrial domains.

3.2.2. RDT&E Mets are a key component in the Integrated Life Cycle Management of weapon systems. They assist with the application of standard systems engineering processes and practices to ensure the integrity, mission assurance, operational safety, suitability and effectiveness of each system throughout its life cycle from concept development through disposal IAW AFPD 63-1/20-1 and AFMCI 63-1201, *Integrated Life Cycle Systems Engineering and Technical Management*.

JEFFREY T. SCHREINER, Brigadier General, USAF
Director of Air, Space and Cyberspace Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFMCI 63-1201, *Integrated Life Cycle Systems Engineering and Technical Management,* 2 December 2022

AFPD 63-1/20-1, *Integrated Life Cycle Management,* 7 August 2018

DAFI 63-101/20-101, *Integrated Life Cycle Management,* 16 February 2024

DAFMAN 15-129, *Air and Space Weather Operations*, 7 September 2023

DAFPD 15-1, *Weather Operations,* 28 May 2024

DoDD 5000.01, *The Defense Acquisition System,* 28 July 2022

Prescribed Forms

None

Adopted Forms

DAF 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

ACC—Air Combat Command

AF—Air Force

AFI—Air Force Instruction

AFIMSC—Air Force Installation and Mission Support Center

AFLCMC—Air Force Life Cycle Management Center

AFMC—Air Force Materiel Command

AFNWC—Air Force Nuclear Weapons Center

AFPD—Air Force Policy Directive

AFRIMS—Air Force Records Information Management System

AFRL—Air Force Research Laboratory

AFSC—Air Force Sustainment Center

AFTC—Air Force Test Center

CONOPS—Concept of Operations

DoDD—Department of Defense Directive

DoDI—Department of Defense Instruction

DT&E—Developmental Test and Evaluation

HAF—Headquarters Air Force

IAW—In Accordance With

MAJCOM—Major Command

OT&E—Operational Test and Evaluation

OPR—Office of Primary Responsibility

RDA—Research, Development, and Acquisition

RDS—Records Disposition Schedule

RDT&E—Research, Development, Test, and Evaluation

S&T—Science and Technology

Office Symbols

AF/JA—Air Force Judge Advocate

HQ ACC/A5W—Air Combat Command Weather Requirements Division

HQ AFMC/A3OW—Weather and Environmental Science Branch

Attachment 2

PROGRAM/PROJECT/WORK UNIT BRIEF FORMAT (UNCLASSIFIED/CLASSIFIED AS NEEDED)

Table A2.1. PROGRAM/PROJECT/WORK UNIT BRIEF FORMAT.

PROJECT/PROGRAM: Next Generation Disintegrating Ray Gun
DATE OF LAST UPDATE: 1 Feb 2024
PURPOSE/PROGRAM DESCRIPTION: (GENERAL OVERVIEW OF PROGRAM/ PROJECT/WORK UNIT)
The purpose of this program is to develop and field a disintegrating ray gun, a man portable hand weapon with adjustable capabilities, capable of melting through structures or rendering enemy personnel unconscious.
ENVIRONMENTAL SENSITIVITIES: (ANYTHING THAT WILL AFFECT THE OPERATION, EMPLOYMENT OR SUPPORT OF THE PROGRAM/PROJECT/WORK UNIT OR ITS SUPPORT SYSTEMS)
Abrasion of lens covers Electro-Magnetic field variations
Absorption of energy by atmospheric gasses/particles/precipitation
Exposure to space environment both near earth and inter-stellar
ANTICIPATED REQUIREMENTS FOR AF WEATHER OPERATIONS AND/OR AF WEATHER WEAPON SYSTEMS: (NEW TECHNOLOGIES, MODELS, MANNING REQUIREMENTS, OPERATIONS CHANGES OR EQUIPMENT REQUIRED TO SUPPORT THE PROGRAM THROUGHOUT ITS LIFE CYCLE)
Climatic atmospheric dust concentrations
Forecast of Electro-Magnetic field densities
Tactical Decision Aid for range and lethality calculations
PROGRAM STATUS: (GENERALIZED TIME TABLE OF PROGRAM INCLUDING TEST PLANS, DEVELOPMENT, DEPLOYMENT, AND FIELDING)
Lead Command: ACC, AMC, AFSOC, etc.
Responsible Organization: AFRL/XXX
Milestones:
Request for Proposal: 1 Mar 2022
Concept Definition: 1 Feb 2023
DT & E: 1Mar 2024

Critical Design Review: 1 Nov 2024

OT & E: 1 Apr 2025

Manufacture: 1 Jun 2026

Field: 1 Nov 2027

PAST/CURRENT/FUTURE SUPPORT: (MAJOR SUPPORT YOU HAVE PROVIDED OR PLAN TO PROVIDE TO SUPPORT THIS PROGRAM/PROJECT)

Helped define environmental requirements

Hosted technical working groups to define environmental sensitivities and support requirements

Established working group to define requirements

DATA AF WEATHER OPERATIONS AND/OR AF WEATHER WEAPON SYSTEMS MIGHT BE ABLE TO USE: (ANY OUTPUT PARAMETERS FROM THIS PROGRAM WITH POTENTIAL WEATHER/SPACE APPLICATIONS)

If releasable, environmental data gathered by airframe/vehicle sensors could be forwarded to AF Weather Weapon Systems to support synthetic-to-live/live-to-synthetic training along with world-wide DoD numerical weather prediction and meteorological watch of missions/sorties participating in training, contingency, and wartime activities.

POINTS OF CONTACT: (AT STAFFMET UNIT, CENTER, LABORATORY, MAJCOM, OR AIR STAFF)

Capt Fantastic (Program Manager) AFRL/XXX DSN 555-5555 email:

Mrs. F. Awesome (Deputy Program Manager) AFRL/XXX DSN 555-5556 email:

Mr. I. M. Weatherwise (RDT&E Mets), AFLCMC/XZIG DSN 785-2208 email:

SUPPORTING DOCUMENTS:

Intergalactic Expeditionary Force CONOPS 08-001,

Tactical Defense Systems, 1 Apr 24

Multipurpose Focused Energy Portable Weapon, 1 Oct 24

ESTIMATED PROGRAM/PROJECT/INITIATIVE/EFFORT COST:

$1.4B is estimated life cycle cost through FY24

VALUE-ADDED REPORT GUIDANCE

Value-added information helps to quantify your contribution to a larger program/project/work unit or goal and may help substantiate the inherently governmental nature of the supporting work. Negative-type reports can also contain valuable information, such as money wasted through unnecessary contracts when in-house RDT&E Mets support was available but not used; retroactive fixes that could have been prevented with appropriate early RDT&E Mets involvement; or inadequate support for testing of fielded systems due to lack of development efforts in another area. Tie your value-added reports and/or support to time saved, which should translate to dollars and cost savings, if possible. Quantifying what value we add is meaningful to others and helps us all in the long run. When first defining, or redefining, support to a particular program or project, try to evaluate and prioritize the benefits you foresee for each contribution. A sense of where the biggest payoffs are for the program may help structure your efforts.

Minimum Value-Added Report Items:

Cost/Financial Impact:

Saved cost of hiring a contractor, which translates to $175K

Advice resulted in purchase of best-value equipment saving $20K

Schedule Impact:

Enabled program to get ahead of schedule by 3 months

Testing completed 3 days early due to forecast saving $150K/day

Performance Impact:

Advice resulted in design change, saving $30M

Enhanced the performance of a system – increased accuracy by 12%

Specific examples:

Damage to telescope mirror due to icing would cost $1M in repair and 6 months downtime.

Without weather support, $400K per year could be wasted in unproductive attempts to test.

Extended sensor window coating life by 300%; service life from 5 years to 15 years.

Weather support saves 10% of program costs per year, which translates to $1.3M for FY24.

Located testing location for key crosswind parameter after program unsuccessfully tried three locations without weather consultation at a cost of $2.4M.

Test moved up three days due to forecasted conditions, saving $1.5M in program costs.

Sensor being re-designed after RDT&E Mets identified unrealistic operating environment saving $14.5M.

Attachment 3

EMERGING TECHNOLOGIES AND WEAPON SYSTEMS REPORT FORMAT (UNCLASSIFIED/CLASSIFIED AS NEEDED)

A3.1. Reports. Reports will be an annual assessment to help weather planners at all levels take into account emerging technologies and weapon system development by and for DoD that may or will have weather sensitivities and may or will need weather support capabilities. Emphasis is on identifying new or enhanced weather support capabilities that are not yet available or planned and will be needed to support future testing and operations, well before the weapon system is tested and fielded.

A3.2. Technology Area: (category). (e.g., hypersonics, hyperspectral, ultraspectral, nanotechnology, visual and acoustic stealth, teleporting) or weapon systems (e.g., laser weapons in lower troposphere, Next Generation Strike Aircraft) being developed and your assessment as to current and planned weather support capabilities, shortfalls/capability gaps in weather support capabilities expected during the time frames, new capabilities needed and what is needed before these technologies and systems are tested and fielded. Provide source for detailed information on each program/technology (e.g., your Project Brief, technical white paper, technical article in journal). Provide as many specifics as possible to include specific dates for when testing will begin, specific weather sensitivities or specific weather support needed to exploit technology or system operationally, new capabilities or enhancements needed for terrestrial weather, space weather forecast models and observation systems/platforms to include new parameters to be observed/forecasted. Assess whether program/project is willing to provide funding for development of necessary weather support capabilities. Reports are normally unclassified, but can include a classified portion when necessary through appropriate classified channels.

A3.3. Emerging Technologies.

A3.3.1. Near-Term (Current to next 5 years)

A3.3.2. Mid-Term (5 to 15 years)

A3.3.3. Far-Term (Greater than 15 years)

A3.4. Emerging Weapon Systems.

A3.4.1. Near-Term (Current to next 5 years)

A3.4.2. Mid-Term (5 to 15 years)

A3.4.3. Far-Term (Greater than 15 years)